MISCELLANEOUS NOTES

1. IS *RHINOPOMA* A RHINOLOPHOID BAT?

(*With four text-figures*)

Current mammalian taxonomy, which is based mostly on morphological and anatomical characters, does not always reflect the phylogeny and interrelationships of the various mammalian taxa, since, in many cases, these characters are adaptive in nature. This is especially true of bats which possess unique morphological characters suited to a nocturnal flying habit and an inverted resting posture. In such cases only embryological characters can be utilised for determining the relative positions of the various familial and intrafamilial groups since other evidences such as from palaeontology, cytology, genetics and serology are not available at present. The importance of embryological characters for determining interordinal and intraordinal relationships of mammals was emphasised by Mossman (1937, 1953, 1971). More recently, Gopalakrishna and Karim (1980) and Gopalakrishna and Chari (1983) have shown that embryological characters are of considerable value in understanding the position and interrelationships of the various families of Chiroptera.

Most authors have considered Rhinopomídae as a primitive family and included it in the superfamily Emballonuroidea along with the family Emballonuridae (Dobson 1875, Simpson 1945, Koopman 1984, Hill and Smith 1985). Gray (1866) had, however, included *Rhinopoma* in rhinolophoids. Recently, Pierson (1985) adduced biochemical evidence to indicate that *Rhinopoma* is closer to Rhinolophoidea than to Emballonuridae.

The present paper is based on the documented studies on the embryology of two emballonurids, *Taphozous longimanus* (Gopalakrishna 1958, Wimsatt and Gopalakrishna 1958, Bhide and Bhatia 1981) and *T. melanopogon* (Sandhu 1986), two rhinopomids, *R. microphyllum* (*R. kinneari*) (Srivastava 1952, Gopalakrishna 1958) and *R. hardwickei* (Karim and Fazil 1986), one rhinolophid, *Rhinolophus rouxi* (Gopalakrishna and Bhivgade 1974, Bhivgade 1977), four hipposiderids, *H. bicolor pallidus* (Gopalakrishna 1958, Gopalakrishna and Moghe 1960), *H. fulvus fulvus* (Gopalakrishna and Karim 1975), *H. speoris* (Jeevaji 1982) and *H. ater ater* (Inamdar 1986) and one megadermatid, *M. lyra lyra* (Gopalakrishna and Khaparde 1978).

Figures 1-4 are schematic diagrams to illustrate the arrangement of the foetal membranes at full term of *Taphozous* (Emballonuridae), *Rhinopoma* (Rhinopomidae), and *Rhinolophus* (Rhinolophidae), *Hipposideros* (Hipposideridae) and *Megaderma* (Megadermatidae) respectively. The figures indicate that while in Emballonuridae there is a well developed haematoma on the mesometrial side of the uterus (an haematoma has been reported only in emballonurids among Chiroptera so far — Wimsatt and Gopalakrishna 1958) and a laterally located placental disc, in all the other families the placental disc is mesometrially located. In hipposiderid bats a central depression in the placenta gives it a bidiscoidal appearance in sectional views. The yolk-sac splanchnopleure in all the families except

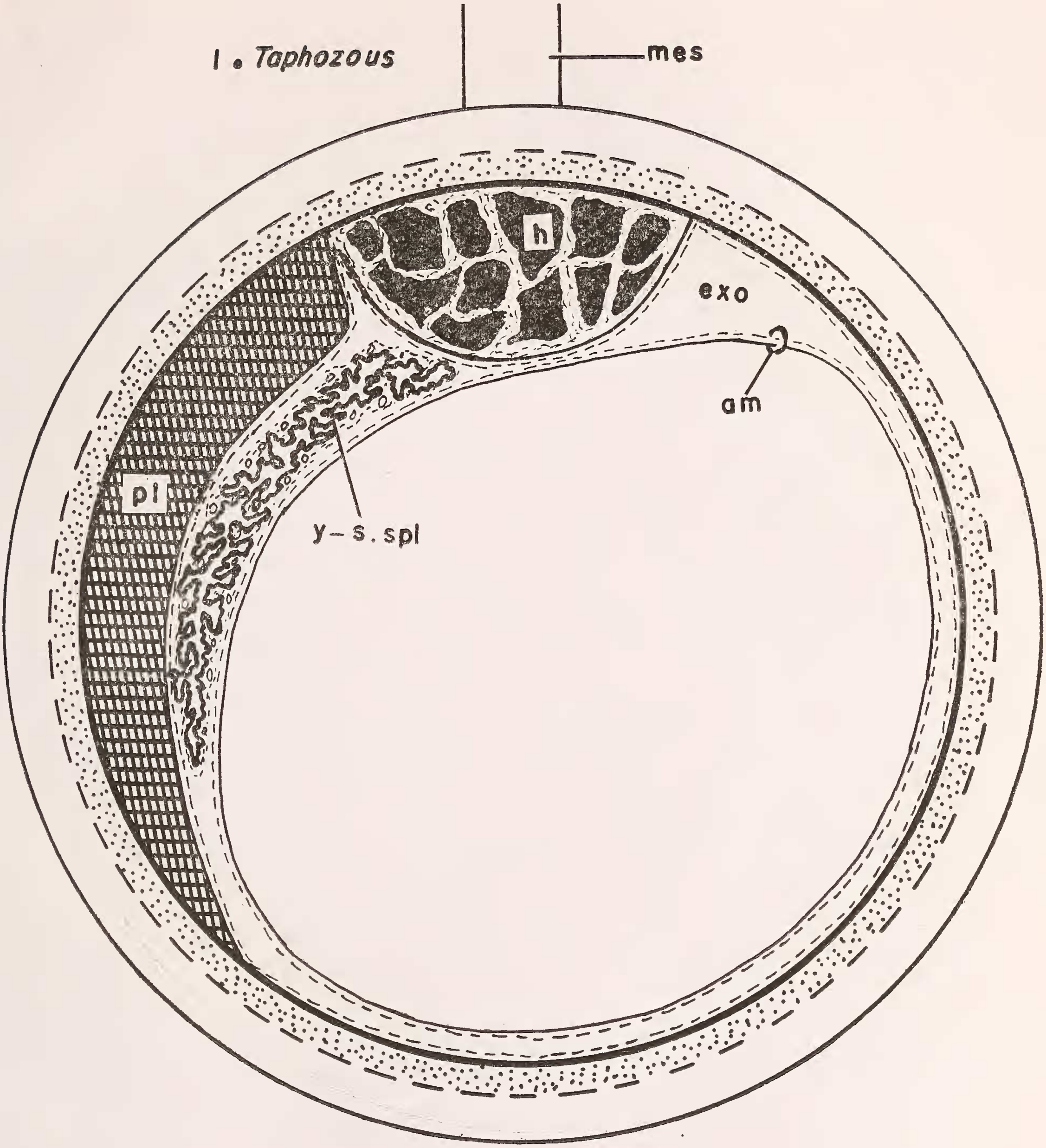


Fig. 1. Schematic drawing to illustrate the disposition of the foetal membrane at full term of *Taphozous*. Please see text for description.

Abbreviations

am, amnion; exo, exocoelom; h, haematoma; mes, mesometrium; pl, alanltoic placenta; y-s. spl, yolk-sac splanchnopleure.

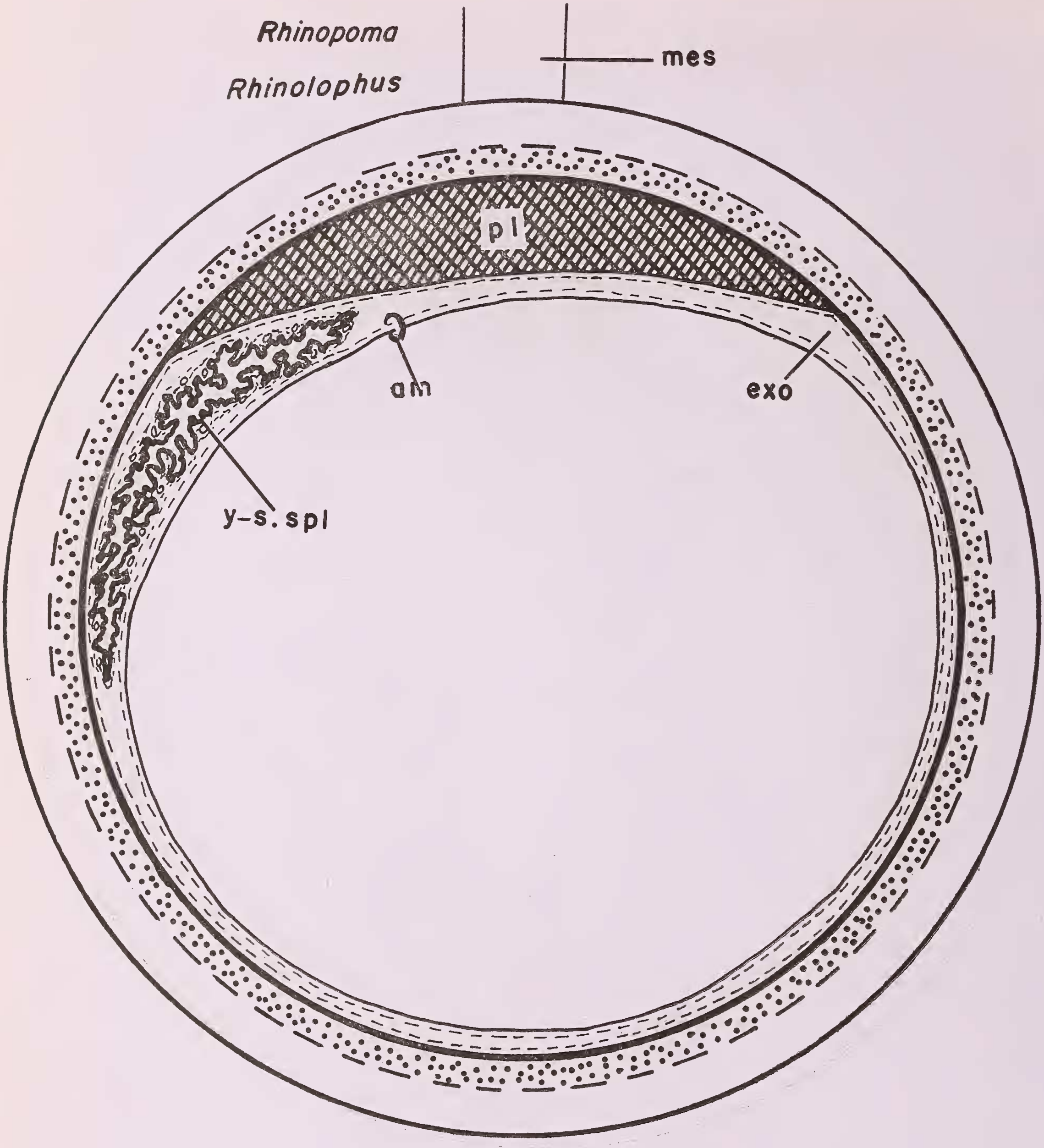


Fig. 2. Schematic drawing to illustrate the disposition of the foetal membrane at full term of *Rhinopoma* and *Rhinolophus*. Please see text for description.

Abbreviations

am, amnion; exo, exocoelom; mes, mesometrium; pl, allantoic placenta; y-s, spl. yolk-sac splanchnopleure.

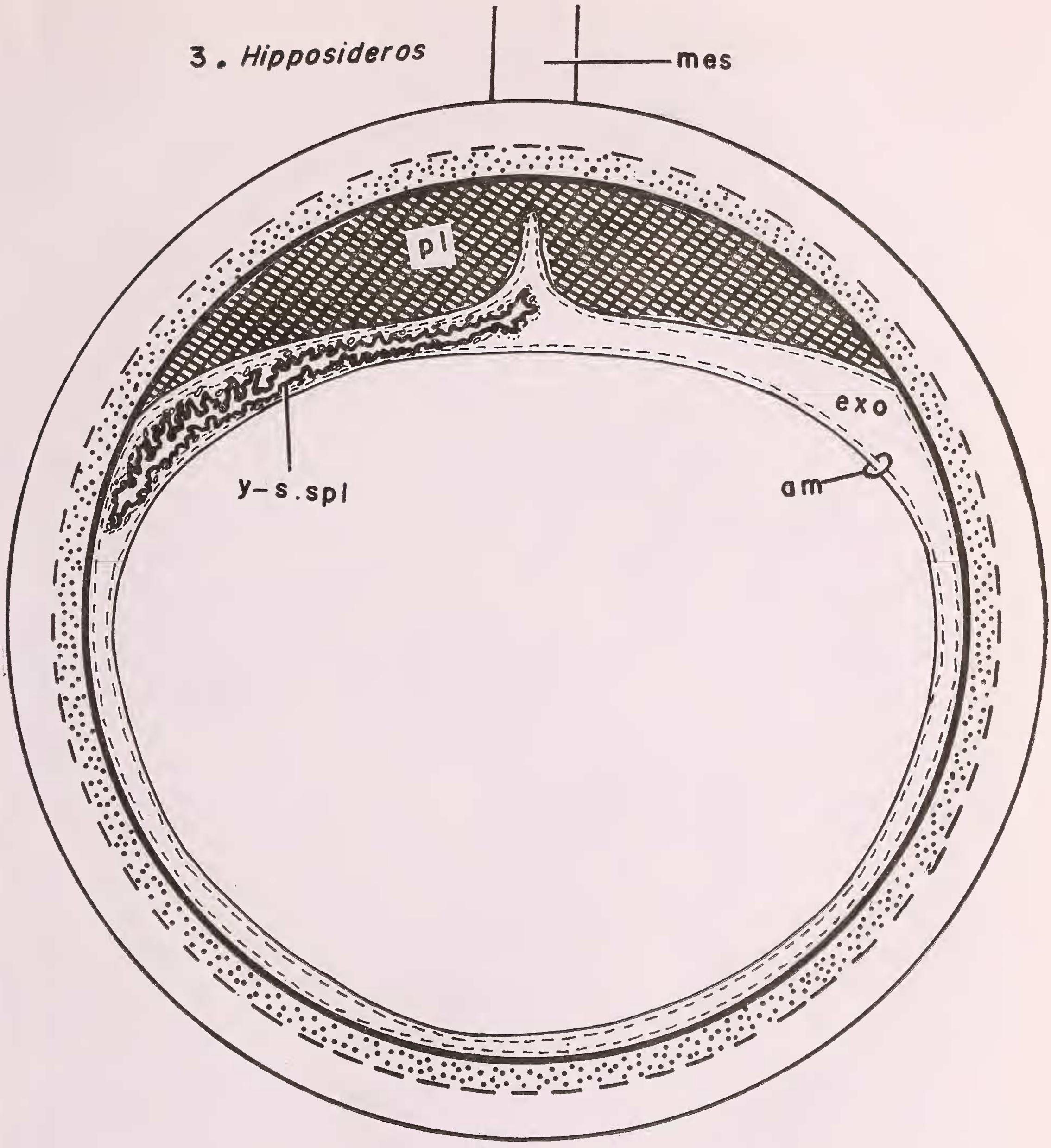


Fig. 3. Schematic drawing to illustrate the disposition of the foetal membrane at full term of *Hipposideros*. Please see text for description.

Abbreviations

am, amnion; exo, exocoelom; mes, mesometrium; pl, allantoic placenta; y-s. spl, yolk-sac splanchnopleure.

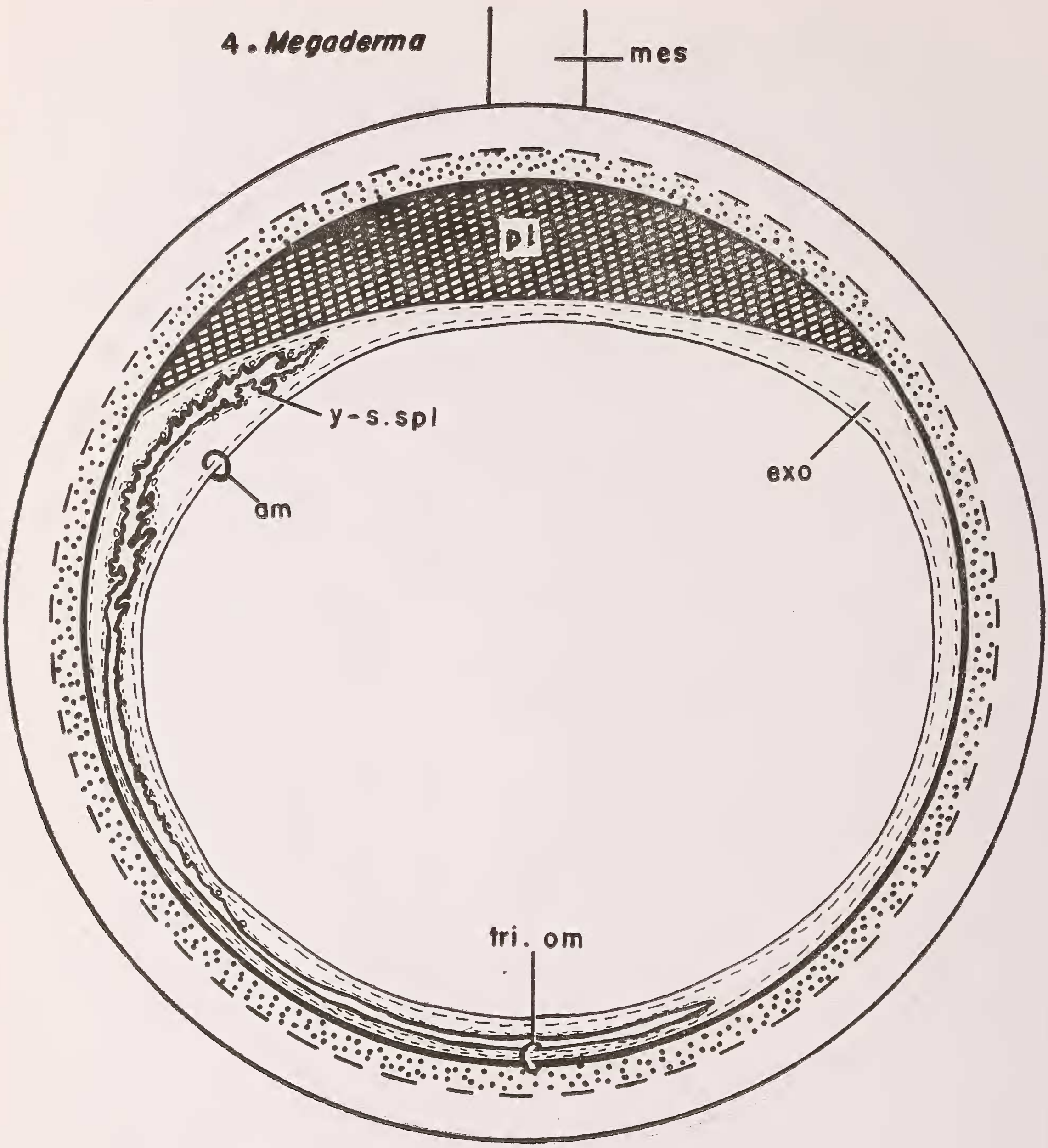


Fig. 4. Schematic drawing to illustrate the disposition of the foetal membrane at full term of *Megaderma*. Please see text for description.

Abbreviations

am, amnion; exo, exocoelom; mes, mesometrium; pl, allantoic placenta, tri. om: trilaminar omphalopleure; y-s. spl, yolk-sac splanchnopleure.

Megadermatidae lies freely in the exocoelom and is thrown into numerous folds. In *Megaderma* the abembryonic part of the yolk-sac splanchnopleure, however, retains its contact with the uterine wall.

The histogenesis of the placenta has been shown to occur in an unique manner in emballonurid bats. Whereas in all other bats the syncytiotrophoblastic mantle is formed by the proliferation from the basal cytotrophoblastic layer, in *Taphozous* a thick zone of large multinucleate trophoblastic giant cells is established after the blastocyst implants (Bhide and Bhatia 1981, Sandhu 1986) and the cells coalesce to form a syncytiotrophoblastic zone. Remnants of the endodermal allantois persist until full term in all the bats under consideration.

The above mentioned embryological details indicate that it is more justifiable to include *Rhinopoma* in Rhinolophoidea than in Emballonuroidea since the rhinopomids present more characters similar to the rhinolophoids than to Emballonuridae. Biochemical evidence in support of this contention is available through the work of Pierson (1985), who, by an immunological comparison of blood proteins, mentioned "1) *Rhinopoma* is no closer to emballonurids than are a number of other taxa (e.g.; vespertilionids, megadermatids, rhinolophids); 2) *Rhinopoma* associates with the rhinolophid clade, and within that group most likely with the megadermatids and nycterids."

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A. GOPALAKRISHNA
N. BADWAIK

DEPARTMENT OF ZOOLOGY,
INSTITUTE OF SCIENCE,
NAGPUR-440 001, INDIA,
December 23, 1986.

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2. SOME NOTES ON THE BREEDING SEASON OF RUFOUSTAILED HARE (*LEPUS NIGRICOLLIS RUFICAUDATUS*)

It appears that the breeding season of rufoustailed hare has not been recorded precisely. Sabnis (1981) reports that the young may be found throughout the year, while Humayun Abdulali (pers. communication, quoted by Sabnis) has records of seeing pregnant females during December to March. Prater (1965) has not recorded any particular breeding season for rufoustailed hare.

In Keoladeo National Park, Bharatpur it appears the breeding season is mainly January to February, closer to the observation of Humayun Abdulali. Altogether four litters were seen, one each on 16 and 21 January, and 9 and 12 February 1987. No young was seen during the rest of the year.

Litter size of rufoustailed hare has been recorded as one to two (Prater 1965). One out of the four litters recorded at Bharatpur had three young, but the very next day of my observation (10 February) I found one young was missing, possibly preyed on as fur was seen scattered on the ground.

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MD. NAYERUL HAQUE

FIELD BIOLOGIST,
BNHS ECOLOGICAL RESEARCH CENTRE,,
331, RAJENDRA NAGAR,
BHARATPUR - 321 001,
May 5, 1987.